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The latent structure of generalized anxiety disorder in midlife adults

David K. Marcus *, Abere Sawaqdeh, Paul Kwon

Department of Psychology, Washington State University, PO Box 644820, Johnson Tower 233, Pullman, WA 99164, USA

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ABSTRACT

Generalized anxiety disorder (GAD) is identified as a discrete disorder in the DSM-5, but evidence suggests that GAD and the related construct of pathological worry possesses a dimensional latent structure. The objective of this study was to ascertain the latent structure of GAD using taxometric methods. A subsample of adults ($N=2061$) from the Midlife in the United States Study, a national sample of Americans, provided the data. Additional data from individuals who were re-interviewed 10 year later ($n=1228$) were also analyzed. Items corresponding to the DSM-IV-TR diagnostic criteria for GAD were used to generate indicators for the taxometric analyses. Multiple taxometric procedures provided no evidence that GAD has a categorical or taxonic latent structure. Instead, the results were more consistent with the proposition that GAD exists on a continuum. Evidence that GAD is dimensional suggests that dichotomizing individuals into GAD versus non-GAD groups will typically result in decreased statistical power. They also suggest that any diagnostic thresholds for identifying GAD are likely to be arbitrary. The findings are consistent with models that locate GAD within the framework of extant dimensional models of personality and with research that emphasizes a multifactorial etiology for GAD.

1. Introduction

The question of whether psychiatric disorders represent qualitatively distinct conditions (analogous to strep throat) or whether they identify the extreme ends of dimensional continua (analogous to most forms of Type II diabetes) is fundamental to psychiatric taxonomy. This question is especially pertinent to the diagnosis of generalized anxiety disorder (GAD) because it is defined by an excess of symptoms that are common in everyday life, such as anxiety, worry, and tension. Do individuals with GAD represent a unique taxon who suffer from a qualitatively distinct/pathological form of anxiety and worry, or are they at the far end of a continuum of anxiety and worry? In the latter instance, GAD may be the manifestation of high trait anxiety (Rapee, 1991) or neuroticism (Hettema et al., 2004). This question of latent structure can be addressed directly using a set of taxometric procedures developed by Meehl and colleagues (Meehl and Yonce, 1994; Waller and Meehl, 1998). Although two published studies have used taxometric methods to examine the latent structure of worry, a review commissioned by the DSM-5 Anxiety, Obsessive–compulsive Spectrum, Posttraumatic, and Dissociative Disorders Work Group found that "there have been no published studies of the latent structure of GAD" and recommended that "the structure of the full syndrome will need to be evaluated directly" (Andrews et al., 2010, p. 143). Similarly, in his review of taxometric studies of psychiatric disorders, Haslam (2007) concluded that it was uncertain whether generalized anxiety was dimensional or taxonic. Most recently, a comprehensive review of 177 taxometric studies of psychopathology and personality found 60 taxometric findings regarding anxiety disorders, including studies that examined the latent structure of worry, but none specifically examined GAD (Haslam et al., 2012).

Most taxometric studies that have examined the latent structure of anxiety-related constructs have yielded dimensional findings (Haslam et al., 2012). Three papers examined constructs more closely related to GAD. Ruscio et al. (2001) examined the latent structure of worry in a large sample of college students. Items from the Penn State Worry Questionnaire (PSWQ; Meyer et al., 1990) and the worry-related items from another measure of GAD served as the indicators of worry. Their analyses yielded consistent evidence that worry has a dimensional latent structure. Olatunji et al. (2010) examined the latent structure of worry in both a large community sample and a large undergraduate sample, using indicators drawn from the PSWQ and other measures of worry and anxiety. Consistent with the findings from Ruscio et al. (2001), Olatunji et al. (2010)found that worry had a dimensional latent structure in both samples. Somewhat complicating these findings, a taxometric study of a large sample of military recruits reported finding evidence of an anxiety taxon (Kotov et al., 2005). However, the indicators used for these analyses were drawn from the Beck Anxiety Inventory (BAI; Steer et al., 1993), the Vulnerability Scale (Schmidt et al., 1995), and an Anxiety Impairment Scale that the authors designed for their study. The BAI, which provided two of the four indicators for the taxometric analyses, primarily assesses autonomic arousal symptoms and panic (Cox et al., 1996), which are not central features of GAD (Brown et al., 1998). Furthermore, none of these

* Corresponding author. Tel.: +1 509 335 7750; fax: +1 509 335 5043.
E-mail address: david.marcus@wsu.edu (D.K. Marcus).

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measures focused on the primary symptoms of GAD, such as worry, tension, and fatigue. Therefore, even if an anxiety taxon exists, it is unlikely that this taxon is isomorphic with GAD.

Although excessive worry is the cardinal symptom of anxiety, most individuals who report high levels of worry do not meet the diagnostic criteria for GAD (Ruscio, 2002). Therefore, it is possible that whereas worry may have a dimensional structure, GAD may be categorical (i.e., in the same way that influenza is a taxonic condition even though one of its hallmark symptoms, elevated body temperature, is dimensional). Additionally, with the exception of one community sample with a mean age of 33.5 (Olatunji et al., 2010, Study 1), all of these other taxometric studies have assessed samples of college students and other young adults. However, GAD prevalence rates appear to peak between the ages of 35 and 54 (Hunt et al., 2002). Therefore, a taxometric study using a mid-life sample may be most appropriate for determining the latent structure of GAD. If GAD is taxonic, a study of middle-aged individuals would be most likely to identify this putative taxon and dimensional results from such a study would carry greater probative weight than studies with young adult samples.

A related issue is that because GAD has a relatively low prevalence rate, taxometric studies with non-clinical samples run the risk of missing a low base rate taxon. Previous studies have somewhat mitigated this risk by using large samples ($N > 1000$). In the current study, we not only used a very large sample ($N > 2000$), but also limited the sample to individuals who reported excessive worry. These sampling procedures increased the base rate of GAD in the sample and reduced the likelihood of failing to identify a GAD taxon if one was present. Finally, if GAD is taxonic, it is reasonable to expect taxon membership to remain relatively stable over time (cf. Watson, 2003). Using a longitudinal data set, in which respondents were re-assessed 10 years after their initial interviews, allowed us to examine whether the latent structure of GAD was consistent at both time points. Furthermore, if GAD was taxonic, we would be able to examine whether taxon membership remained consistent over 10 years. Thus, as the first study to examine the latent structure of GAD in a longitudinal sample of middle-age adults who reported excessive worry, the current study may provide more definitive conclusions about the latent structure of GAD.

2. Methods

2.1. Subjects

This study used archival data collected in the National Survey of Midlife Development in the United States (MIDUS) in 1995–1996 and the follow up MIDUS 2 study in 2004–2006. The MIDUS is a national survey conducted by a multidisciplinary team examining the influence of physiological, behavioral, psychological, and social factors in accounting for variations across age groups in health and wellness. The original MIDUS 1 study consisted of 7108 non-institutionalized, English-speaking adults between the ages 25–74. Additional details about the survey and sample are available at http://www.midus.wisc.edu.

The subsample used in this study was composed of 2061 individuals who were administered the full GAD telephone questionnaire because they affirmed that they worry a lot more than most people, they worry every day or most days, and they worry about "more than one thing or worry about different things at the same time." The sample included 1141 women (55.4%) and 883 men (42.8%); 38 participants did not report their sex. The mean age was 42.89 years (S.D.=11.51 years). Participants were predominantly white (n=1598, 77.5%). In terms of marital status, 63.6% (n=1310) of the participants were married, 3.4% (n=71) separated, 15.3 divorced (n=316), 3.0% (n=61) widowed, and 14.6% (n=301) never married.

2.2. Measures

Both the MIDUS 1 and MIDUS 2 utilized screening versions of the World Health Organization's (WHO) Composite International Diagnostic Interview, Version 10 (CIDI; World Health Organization (1990)). The CIDI has good test–retest reliability and clinical validity (Wittchen, 1994). The telephone questionnaire derived from the CIDI assessed GAD symptoms over the past 12 months.

2.3. Taxometric analyses

We used three nonredundant taxometric procedures: Mean Above Minus Mean Below A Cut (MAMBAC; Meehl and Yonce, 1994), MAXimum EIGenvalue (MAXEIG; Waller and Meehl, 1998), and Latent-Mode (L-Mode; Waller and Meehl, 1998). MAMBAC requires an input and output indicator, with the input data sorted along the x-axis. A series of cuts are made along this axis (50 in the current study), and at each cut the difference between the mean above the cut and the mean below the cut of the output variable is plotted along the y-axis. If the construct is taxonic, the graph has an inverse U-shape, and the peak of the graph represents the taxon base-rate. A dimensional construct prototypically yields a U-shaped curve. Because the current study included seven indicator variables, one variable served as the output indicator and the other six were summed to create the input variable (Walters and Ruscio, 2009), yielding seven MAMBAC curves.

For MAXEIG, the sample is divided into series of overlapping windows along the input indicator (25 windows with 0.90 overlap in the current study, Walters and Ruscio, 2010). The output indicator is the eigenvalue of the first principle component from a principal component analysis of the remaining variables. A prototypical MAXEIG graph for a taxonic construct has an inverse U-shape, which peaks at the window with the maximum eigenvalue where there is a roughly equal number of taxon and complement members. A dimensional MAXEIG graph may be flat, U-shaped, or irregular. In L-Mode, all of the indicators are factor analyzed and the distribution of scores on the first principal factor is graphed. A bimodal graph indicates a taxonic structure and a unimodal graph indicates a dimensional structure.

Because factors such as skew or the correlations among the indicators can influence the shape of taxometric graphs, it is sometimes difficult to visually interpret the results of these taxometric procedures. One solution is to create simulated data sets that reproduce essential features of the data while varying whether the simulated sets are taxonic or dimensional, analyzing these data sets using MAMBAC, MAXEIG, and L-Mode, and then comparing the graphs from the actual data to the graphs of the simulated data (Ruscio et al., 2007). We generated 100 samples of simulated taxonic and dimensional data and used comparison curve fit indices (CCFI) to assess goodness-of-fit between the graphs of the actual data and the simulated taxonic and dimensional graphs. CCFI values less than 0.45 are consistent with a dimensional structure and those greater than 0.55 support a taxonic structure. These CCFI values can be averaged across the three taxometric procedures and the dual-threshold criteria (< 0.45 or > 0.55) can be applied to this mean CCFI value. Monte Carlo studies (e.g., Ruscio et al., 2010) have found that this method is highly accurate for identifying a construct's latent structure, even when the taxon base rate is small (Ruscio and Marcus, 2007). The analyses were conducted using Ruscio's (2012) program for R.

3. Results

3.1. Indicators and base rates

The seven indicators for the taxometric analysis corresponded to the Diagnostic and Statistical Manual of Mental Disorders (4th ed.—text revision; DSM-IV-TR; American Psychiatric Association, 2000) GAD criteria B (difficult to control worry) and C (restlessness, fatigue, difficulty concentrating, irritability, muscle tension, and sleep disturbance). Because the MIDUS study used criterion A (excessive worry) to screen whether the GAD module should be included, all of the respondents in these samples endorsed this criterion. There was one interview question corresponding to each of two of the symptoms (irritability and muscle tension), and there were two interview questions for each of the other five symptoms (e.g., trouble falling asleep and trouble staying asleep for sleep disturbance). For these five symptoms the indicators were created by averaging the two items. Scores on each item ranged across a four-point scale from 0 (never) to 3 (most days). A list of the items and their psychometric properties are provided in Table 1.

To estimate the base rate of GAD in the subsamples of respondents, we calculated the number who endorsed experiencing at least three of the six criterion C symptoms on "most days." The base rate estimate for the original MIDUS subsample was 21.3% (439 of 2061) and in the follow-up subsample it was 19.5% (240 of 1228). Both of these estimates are consistent with Ruscio's (2002) report of the rates of GAD among college students who were high worriers, which ranged from 17.1% to 21.5% across three samples.

The indicators used for a taxometric analysis should be valid and capable of distinguishing between a presumptive taxon and a